Methamphetamine use behaviors and gender differences

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Abstract

This analysis describes methamphetamine (MA) use behaviors in a broad cross-section of ($N = 350$) former clients from a large publicly funded treatment system and examines differences between males and females in drug use history, MA initiation and motivators, MA-related problems, acquisition, distribution, manufacture, and treatment characteristics. Results show polydrug use, prolonged MA use before treatment, initiation primarily through friends, common sensation-seeking motivators (to have fun, get high, and experiment), numerous problems related to MA use (including paranoia, violent behavior, hallucinations, financial problems, and legal and work problems), and a majority who have sold MA. Gender differences appear in selected aspects of motivators and routes of initiation, access to MA, use patterns, and MA-related problems. Such description of behaviors and gender differences can provide a basis for development of treatment strategies and points of departure for future research.
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1. Introduction

Use of methamphetamine (MA) is a problem of great concern because of its increasing prevalence, its relationship to HIV risk behaviors and other health risks, and its association with neurological compromises such as memory impairment. Promising treatment approaches are being tested (Obert et al., 2000; Rawson, 1999); additional data on MA behaviors and

gender differences for a broad cross-section of the treatment population can inform these new treatment initiatives to specialize treatment and prevention strategies. The current study describes a range of MA-related and other substance use behaviors and examines gender differences in these behaviors.

Increases in MA-related problems during the last decade are apparent in a variety of indicators (see, e.g., Anglin, Burke, Perrochet, Stamper, & Dawud-Noursi, 2000; Wermuth, 2000 for general MA epidemiology reviews). Admissions to treatment for MA use have increased dramatically in many states; for example, admissions to publicly funded treatment for MA in California increased 226% from 1992 to 1998 (Brecht, 2001) and 540% in Hawaii during approximately the same period (Wood, 1999). Penetration has spread from the West Coast to several areas of the Midwest and South (Herz, 2000; McCaffrey, 2000). Emergency department and medical examiner reports involving MA more than doubled during the 1990s (SAMHSA, 2000a, 2000b). There was also a steady increase in percent of arrestees testing positive for MA in many areas during this decade, e.g., a 10-fold increase in Omaha (Herz, 2000; National Institute of Justice, 1999). The demographic penetration of MA use has also expanded. Whereas MA use was previously thought to be used primarily by less educated, lower socioeconomic status nonminority groups, now other groups of MA users are appearing such as Latinos, gay/bisexual males, older adult arrestees, and adolescents (Anglin, Kalechstein, Maglione, Annon, & Fiorentine, 1998). High use rates are emerging for women, equivalent to those of men in many areas (National Institute of Justice, 1999).

The increasing trends in MA use are of particular concern because of its deleterious effects on individuals and related social costs. The attendant behaviors of MA use, which include high-risk sexual behaviors and injection use (e.g., Frosch, Shoptaw, Huber, Rawson, & Ling, 1996; Reback & Grella, 1999), place MA users at increased risk for HIV, hepatitis, and tuberculosis transmission (e.g., Molitor et al., 1999; National Institute on Drug Abuse, 2000; Shoptaw, Reback, & Freese, 2002). Long-term effects may include paranoia and psychosis, myocardial ischemia, arrhythmias, dyspnea, cerebral edema, hyperpyrexia, preterm labor and fetal distress and neurotoxicity, malnutrition and weight loss, and potential neurological damage resulting in cognitive impairment (e.g., Beebe & Walley, 1995; Dixon, 1989; Gouzoulis-Mayfrank et al., 1999; Heller, Bubula, Law, Heller, & Won, 2001; Hong, Matsuyama, & Nur, 1991; Kalechstein, Newton, Longshore, van Gorp, & Anglin, 2000; Swalwell & Davis, 1999).

The evolving epidemiology of MA use often has directed research focus on MA use behaviors within specific risk behavior subpopulations of MA users. For example, recent studies reporting high frequencies of MA use within the Los Angeles gay/bisexual community have spurred examination of HIV risk-taking behavior (Anderson & Glynn, 1997; Nagata, 1995; Rotheram-Borus, Luna, Marotta, & Kelly, 1994; Wada, Greberman, Konuma, & Hirai, 1999; Zule & Desmond, 1999). Work has also focused on HIV risk-taking behaviors specifically within gay male populations (Frosch et al., 1996; Gorman & Carroll, 2000; Gorman, Morgan, & Lambert, 1995; Guss, 2000; Reback & Grella, 1999; Shoptaw, Reback, Frosch, & Rawson, 1998). Molitor, Truax, Ruiz, and Sun (1998) has examined MA-related sexual risk-taking behavior in noninjecting men and women. Other studies have addressed the prevalence and nature of intravenous drug use behaviors (Domier, Simon, Rawson, Huber, & Ling, 2000; Molitor et al., 1999).

Studies have also examined MA use behaviors in subgroups of homeless, runaway, and street youth (Gleghorn, Marx, Vittinghoff, & Katz, 1998) and juveniles (MacKenzie & Heischober, 1997; Oetting et al., 2000; Pennell, Ellet, Rienick, & Grimes, 1999). Pennell et al. (1999), for example, describe MA use behaviors among juvenile arrestees, including age of initiation and frequency of use, motivation, acquisition and distribution, and MA-related problems. The current study expands the perspective on MA-related behaviors from specific subpopulations of MA users to a wider diversity of users from the public treatment system. Descriptions from qualitative analysis have been presented based on a portion of the current sample (von Mayrhauser, Brecht, & Anglin, 2002); these descriptions focused primarily on motivations for MA use. The current quantitative analysis is complementary and addresses a broader range of both MA behaviors and gender differences.

Few studies to date have empirically compared men's and women's MA use behaviors. Some ethnographic work has explored gender differences, e.g., in terms of gender-specific meaning of MA use (Irwin, 1995; Joe, 1995, 1996). The importance of potential gender-specific issues or gender differences for informing prevention and treatment strategies has motivated numerous studies on this topic for non-MA substances (e.g., Anglin, Hser, & Booth, 1987; Chavkin, Paone, Friedman, & Wilets, 1993; Copeland & Hall, 1992; Grella & Joshi, 1999; Grella, Polinsky, Hser, & Perry, 1999; Kaufman, 1996; Marsh, D'Aunno, & Smith, 2000; Ross, 1989; Strantz & Welch, 1995; Wallen, 1992; Weissman et al., 1995). Treatment approaches have been tailored to meet gender-specific needs; see, for example, Uziel-Miller and Lyons (2000) for a review of 36 specific treatment programs for women and their children. None of this work on gender differences, however, examines *MA-specific* issues. Thus, a broad description of gender-specific MA use behaviors remains crucial to the development of appropriate MA use prevention and treatment strategies.

The purpose of this paper is to describe MA use behaviors in a broad cross-section of treatment clients and to examine differences in these MA use behaviors between males and females. Through identifying similarities, we can contribute to a more comprehensive description of MA use; through recognizing differences, we can provide considerations for treatment strategies and points of departure for future research.

2. Methods

2.1. Sample

The data for the current analysis were generated from a sample of 350 substance users who were treated for MA use in publicly funded Los Angeles County programs. The original random sample of admission records (mostly from 1996) was stratified by gender, ethnicity, and treatment modality (residential and outpatient). Invitations for study participation were sent by treatment programs to the sample. A 76% interview rate was achieved from the sampled clients who could be located: 365 were interviewed, 88 declined participation, 28 expressed interest but found it impossible to schedule an interview during the study period, 6

had died, and another 151 from the original sample could not be located. Fifteen of the 365 interviews were not included in the current analysis because of incomplete or inconsistent data, producing the analysis sample of 350 reported here. Interviews conducted between December 1998 and December 2000 took place ~2–3 years after admission to the "target" (i.e., the sampled) treatment episode.

A comparison of data available from admission records for the interviewed versus all those sampled but not interviewed (including declined participation, not located, etc.) showed no significant differences in terms of education, age of first MA use, age at treatment admission, number of prior treatment episodes, employment status at admission, and whether homeless, pregnant, or under legal supervision. Thus, the sample broadly represents on these character-istics the population of adult MA users who access the Los Angeles County public treatment system. Table 1 summarizes relevant demographics.

2.2. Instruments/variables

Subjects were interviewed using the Natural History Interview (NHI) protocol. The first section of the NHI elicits information regarding sociodemographics and other background

Table 1
Sample characteristics (N=350)

Characteristic	Percent
Sociodemographics	
Gender (% male)	56
Ethnicity	
African American	16
Hispanic	29
Non-Hispanic White	46
Other	8
Education	
Less than high school diploma	32
High school	21
Trade/tech school	15
At least some college	32
Have child(ren)	71
Income	Median $14,000
Health, lifestyle, risk, and vulnerability factors	
Parents divorced	65
Familial substance abuse problems	71
Ever had inpatient care for psychological problems	27
Ever attempted suicide	27
Early sexual abuse (before age 15)	33
Early physical abuse (before age 15)	33
More than five arrests	51
Illegal income (in 12 months before interview)	13
Same sex partner (gay/lesbian/bisexual)	13

factors, physical and mental health, criminal behavior, and substance use. The second section of the NHI entails a timeline approach, enabling the respondent to link behaviors to concrete events and to account for changes in behavior across domains of substance use, drug and psychiatric treatment, crime and legal status, and employment. The NHI has been used for 30 years for research in heroin and cocaine abuse, with acceptable levels of agreement of self-report and urinalysis and pattern reliability of constructs across time (Anglin, Hser, & Chou, 1993; Chou, Hser, & Anglin, 1996; Hser, Anglin, & Chou, 1992). Selected items on MA initiation, problems, and acquisition/distribution behaviors were adapted from Pennell et al. (1999). More details on interview and study procedures appear in von Mayrhauser et al. (2002).

The sample is described in terms of sociodemographic and background factors (ethnicity, education, number of biological children, and household income) and lifestyle, risk, and potential vulnerability factors (same-sex sex partners, parental divorce, familial drug and alcohol problems, inpatient psychiatric treatment, suicide attempt, childhood sexual and physical abuse history, history of arrests, and illegal income). Substance abuse variables cover MA use history as well as history of other drug use. Additional detail is provided on MA use behaviors: motivation for initiation, perceived consequences of MA use, route and frequency of use, involvement in and nature of buying, and selling and making MA. In this study, gender is self-defined as male or female. Broad categories from self-reported race/ethnicity are used in this analysis: African American, Hispanic, non-Hispanic White, and other.

2.3. Analysis

Sample characteristics and MA-related behaviors are summarized in terms of percentages, means, and standard deviations. Gender differences were analyzed using χ^2 or t tests as appropriate to the distributional characteristics of the variables. To extract the maximum level of information on gender differences from the study's data, the analysis included a relatively large number of statistical tests. In this context to reduce the likelihood of type I error, an adjustment applied to P-values is appropriate. A standard adjustment, such as the Bonferroni across all tests, may be too conservative because of the exploratory nature of the study (and low power of the Bonferroni) and because many of the variables analyzed may be correlated, resulting in dependency among test statistics (e.g., Benjamini & Hochberg, 1995; Sankoh, Huque, & Dubey, 1997). Thus, to guide interpretation of results, two alternative adjustments have been applied: (1) a Bonferroni adjustment applied within subgroups of tests by content area and (2) an adjustment for the false discovery rate (FDR). The first strategy relaxes somewhat the traditional Bonferroni conservative adjustment across the entire family of tests by adjusting within content area subgroups (e.g., 5 variables reflecting general substance use, 10 specific types of substances not used by most respondents, and 11 motivators for MA use). The FDR is the expected proportion of false discoveries among the discoveries; it balances control for increased error from multiple tests with sensitivity to detect effects (Benjamini, Drai, Elmer, Kafkafi, & Golani, 2001; Curran-Everett, 2000; Keselman, Cribbie, & Holland, 1999). In Table 2, test statistics and unadjusted probabilities are given if $P < .10$; for these

Table 2
MA-related behaviors: total sample and by gender

Characteristic	Total[a] [% or mean (S.D.)]	Males [% or mean (S.D.)]	Females [% or mean (S.D.)]	χ^2 or t test (df, if not 1)[b]	P (unadjusted)[b]	P (FDR)[c]
General substance use						
Age of first use, any substance	11.55 (3.56)	11.34 (3.78)	11.82 (3.27)	NS	NS	NS
No. of drugs ever used (of 10 types) other than alcohol, tobacco, marijuana, and MA	5.01 (2.45)	5.45 (2.35)	4.46 (2.47)	3.82 (3.48)	<.001	.002[d]
Ever injected drugs	47	54	37	9.48	.002	.013[d]
Ever shared needles	36	41	29	5.45	.020	.066
Engaged in sex for money or drugs	15	15	15	NS	NS	NS
Substances used						
Alcohol	100	99	100	NS	–[e]	–
Marijuana	99	99	99	NS	–	–
Tobacco	97	96	97	NS	–	–
Cocaine	87	89	86	NS	NS	NS
Hallucinogens	75	82	67	10.46	.001	.008[d]
Crack	71	77	63	7.32	.007	.033
Inhalants	56	62	48	7.58	.006	.030
PCP	55	62	47	7.71	.005	.026[d]
Heroin	37	45	28	10.09	<.001	.011
Tranquilizers	37	36	38	NS	NS	NS
Downers	33	39	25	6.69	.010	.040
Other opiates	29	31	27	NS	NS	NS
Ecstasy	20	23	16	NS	NS	NS
MA initiation/transition						
Age of first MA use	18.98 (5.58)	19.34 (5.73)	18.54 (5.36)	NS	NS	NS
Years from first MA use to regular MA use	2.14 (4.15)	2.56 (4.66)	1.60 (3.33)	2.21 (335)	.036	.094
Means of MA initiation						
Friend	59	63	53	9.35 (2)	.009	.038[d]
Spouse or boy/girlfriend	13	9	20			
Other	28	28	27			
Motivators for MA use						
Get high	50	49	52	NS	NS	NS
For fun	45	40	50	NS	NS	NS
Friends use	45	44	47	NS	NS	NS
Energy	44	38	52	7.05	.008	.036
Experiment	41	43	39	NS	NS	NS
Stay awake	34	32	35	NS	NS	NS

Table 2 (*continued*)

Characteristic	Total[a] [% or mean (S.D.)]	Males [% or mean (S.D.)]	Females [% or mean (S.D.)]	χ^2 or t test (*df*, if not 1)[b]	*P* (unadjusted)[b]	*P* (FDR)[c]
MA initiation/transition						
Motivators for MA use						
Escape	24	22	26	NS	NS	NS
Replace drug	20	22	17	NS	NS	NS
Better sex	19	23	14	5.15	.023	.073
Weight loss	19	7	36	47.39	<.001	<.001[d]
Work more	15	19	10	6.03	.014	.052
MA use						
Most consecutive days using MA	212.36 (602.74)	140.87 (250.42)	304.68 (859.79)	−2.27 (169.8)	.025	.074
No. of times using MA per day	9.65 (11.32)	9.20 (11.35)	10.22 (11.29)	NS	NS	NS
Usual method of use						
Snort	44	39	50	9.31 (3)	.025	.074
Smoke	34	36	31			
Inject	20	24	15			
Eat/drink	2	1	4			
MA-related problems						
No. of types of MA-related problems (of 11)	6.76 (3.08)	6.64 (2.91)	6.27 (2.81)	NS	NS	NS
Types of problems						
Weight loss	84	84	84	NS	NS	NS
Sleeplessness	78	78	80	NS	NS	NS
Financial problems	73	73	72	NS	NS	NS
Paranoia	67	71	62	NS	NS	NS
Legal problems	63	66	60	NS	NS	NS
Hallucinations	61	67	54	5.65	.017	.058
Work problems	60	70	48	16.74	<.001	<.001[d]
Violent behavior	57	57	56	NS	NS	NS
Dental problems	55	50	62	4.42	.036	.094
Skin problems	36	28	47	13.88	<.001	.002
High blood pressure	24	31	16	8.28	.004	.022
Acquisition of MA						
Have one primary source	84	82	86	NS	NS	NS
Main source is male	79	76	82	NS	NS	NS
Use only one source in a typical week	35	36	35	NS	NS	NS
Alternatives to main source						
Bought from someone else	75	78	72	NS	NS	NS

Table 2 (*continued*)

Characteristic	Total[a] [% or mean (S.D.)]	Males [% or mean (S.D.)]	Females [% or mean (S.D.)]	χ^2 or t test (*df*, if not 1)[b]	*P* (unadjusted)[b]	*P* (FDR)[c]
Acquisition of MA						
Alternatives to main source						
Received from friend	47	52	41	NS	NS	NS
Went without	40	39	41	NS	NS	NS
Used another drug	25	34	13	17.71	<.001	<.001[d]
Alternatives to paying money						
Got it for free	81	81	82	NS	NS	NS
Traded something (including sex) for it	61	61	60	NS	NS	NS
Had dealer front it	61	59	62	NS	NS	NS
Dealing	30	32	27	NS	NS	NS
Stole it	18	24	11	8.83	.003	.018[d]
Cooked it	11	16	5	9.44	.002	.013[d]
Suppliers used when not paying money						
Friends	72	71	73	NS	NS	NS
Dealers	65	63	67	NS	NS	NS
Spouses	29	24	35	4.56	.033	.094
Other family members	14	13	15	NS	NS	NS
Coworkers	10	15	3	12.21	<.001	.004[d]
Distribution of MA						
Ever sold MA	56	55	57	NS	NS	NS
Sold within 1 month of initial use[f]	37	52	17	24.43	<.001	<.001[d]
No. of months selling[f]	48.07 (49.09)	54.83 (55.51)	39.65 (39.49)	2.14 (191)	.034	.094
Carried weapon while dealing[f]	42	48	35	NS	NS	NS
Manufacture of MA						
Ever made MA	13	15	11	NS	NS	NS
Locations of production[g]						
Another's house	57	57	56	NS	NS	NS
Motel	37	43	25	NS	NS	NS
Mobile vehicle	37	48	13	5.76	.016	.057
One's own house	30	40	13	NS	NS	NS
Outdoors	26	33	13	NS	NS	NS
Storage unit	20	28	6	NS	NS	NS
Chemicals easily obtainable[g]	70	70	69	NS	NS	NS

Table 2 (*continued*)

Characteristic	Total[a] [% or mean (S.D.)]	Males [% or mean (S.D.)]	Females [% or mean (S.D.)]	χ^2 or t test (df, if not 1)[b]	P (unadjusted)[b]	P (FDR)[c]
Treatment related						
No. of years first MA use to treatment for MA	9.34 (6.97)	9.69 (7.24)	8.76 (6.63)	NS	NS	NS
No. of months in first treatment for MA	3.28 (4.20)	2.76 (4.17)	3.90 (4.15)	−2.54	.011	.043[d]
Relapse within 6 months	58	62	52	3.28	.070	.152

[a] Unless otherwise noted, n for most variables is 350; some have one to four cases missing.

[b] Test statistic and P-values shown for variables with unadjusted $P < .10$.

[c] Adjusted P-values using FDR procedure; those superscripted have Bonferroni-adjusted within content area $P < .05$.

[d] Bonferroni-adjusted within content area $P < .05$ (but actual value is not shown in table).

[e] Because percentages are at or near 100%, these three drugs were not included in the adjusted probability calculations.

[f] Of 194 who sold MA.

[g] Of 46 who made MA.

variables, the FDR-adjusted probability is also given and a notation if Bonferroni-adjusted $P < .05$. With a few exceptions, the discussion of gender differences in the text is for variables where FDR-adjusted $P \leq .05$.

3. Results

3.1. Sample characteristics

Sample characteristics are summarized in Table 1. In terms of sociodemographics, the sample encompassed a diverse population: 56% were male and 46% were non-Hispanic White, 29% Hispanic, 16% African American, and 8% other/multiethnic. Thirty-two percent had less than a high school diploma, while the same percent had at least some college. Most had children (71%), averaging 2.75 (S.D. = 1.68) for those with children; more females (88%) than males (57%) in the sample had children ($\chi^2 = 37.87$, $df = 1$, FDR-adjusted $P < .001$). While the range of income was broad ($0–289,000), the median was $14,000 for the year preceding the interview.

The sample experienced high rates of familial and psychological problems. One-third of the sample reported childhood (before age 15) sexual abuse. A significantly higher percentage of females (44%) experienced childhood sexual abuse than males (24%) ($\chi^2 = 15.67$, $df = 1$, FDR-adjusted $P < .001$). Similar percentages of females and males reported childhood physical abuse (32% and 34%, respectively). Approximately one-fourth (27%) had attempted suicide and a similar percent had experienced inpatient care for psychological problems. Two-

thirds had parents who divorced during the respondents' childhoods. Over half (56%) reported parental alcohol and/or substance use problems.

We see high rates of reported criminal behavior: 94% had been arrested at least once and 51% had been arrested more than five times. Males reported more arrests overall (72% of males had > 5 arrests vs. 25% of females; $\chi^2 = 75.28$, $df = 1$, FDR-adjusted $P < .001$) and were more likely to have been arrested as juveniles than were females (54% of males vs. 28% of females, $\chi^2 = 24.16$, $df = 1$, FDR-adjusted $P < .001$). Seventy percent reported past involvement in selling or delivering drugs; over half reported ever having sold MA. Thirteen percent had earned money illegally during the year preceding the interview. Specific reasons for each arrest were not recorded, but reported number of days involved in specific types of crimes indicated a predominance of drug dealing (average 932 days) compared with other crimes (still at a high level of average 570 days).

3.2. Substance use behaviors and gender differences

Table 2 summarizes substance use characteristics for the sample as a whole and for males and females separately. For gender differences, as previously mentioned, test statistics and probabilities are given if unadjusted $P < .10$; for these variables, the FDR-adjusted probability is also given and a notation if Bonferroni-adjusted $P < .05$. With a few exceptions, the discussion of gender differences in the text below is for variables where FDR-adjusted $P \leq .05$.

3.2.1. General substance use

Polydrug use and early initiation to substance use characterized this sample. Almost all had used tobacco (97%), alcohol (100%), and marijuana (99%). A majority reported using cocaine (87%), hallucinogens (75%), crack (71%), PCP (55%), and inhalants (56%). A substantial minority reported past use of heroin (37%), tranquilizers (37%), or downers (33%). More males than females reported use of hallucinogens, crack, inhalants, PCP, heroin, and downers. Excluding substances used by all or almost all (tobacco, alcohol, marijuana, and MA), the average number of substances used was 5 of 10 types, with males using more types (average 5.45) than females (average 4.46). The average age of first use of any substance was 11.55 (S.D. = 3.56) years, and no gender differences were found in initiation age overall or for age of initiation of specific substances.

Almost half the sample had injected drugs, over a third had shared needles, and 15% had engaged in sex for money or drugs. While a similar percentage of males and females had engaged in sex work (15%), a significantly higher percentage of males than females had injected drugs (54% vs. 37%).

3.2.2. MA initiation

MA initiation occurred at an average age of 18.98 years (S.D. = 5.58) and regular use for 96% of the sample lagging by ~2 years (average 2.14 years, S.D. = 4.15). While not statistically significant, females transitioned to regular use somewhat more quickly than did males (1.60 vs. 2.56 years, respectively). Note that "regular" use was allowed to be self-defined by the respondent; however, if respondents asked for clarification, then it was defined

as at least 3 days/week. Additional analyses (not shown in Table 2) examined number of days of use per month as reported on the NHI timeline and found that 89% of the sample has escalated MA use to at least 20 days/month, within an average time of 3.12 years (S.D. = 4.49) after initiation.

The respondents were usually introduced to MA by a friend (59%), with other routes of introduction including spouses, boyfriends or girlfriends (13%), parents (3%), other family members (12%), coworkers (3%), dealers (3%), and others (8%). A significant difference by gender existed in source of introduction: more females were introduced through spouses/boyfriends/girlfriends than were males (20% vs. 9%), while more males were introduced through friends (63% vs. 53%).

Initial MA use was commonly motivated by wanting to get high (50%), to have fun (45%), to get energy (44%), or to experiment (41%). Having friends who used also facilitated initiation (45%). Less common reasons for MA use included to stay awake (34%), to escape (24%), for better sex (19%), to lose weight (19%), or to work more (15%). Despite the prevalence of polydrug use, only 20% reported initially using MA to replace another drug. Five times the percentage of females than males attributed initial MA use to a desire to lose weight (36% vs. 7%) and more females reported using MA to get more energy (52% vs. 38%), while males were somewhat (but not significantly) more likely than females to report being motivated by the desire to work more hours (19% vs. 10%).

3.2.3. MA use

The longest periods of continued daily use averaged 212 days. During periods of highest use respondents reported frequent use (average 9.65 times per day, S.D. = 11.32) with almost daily use (27.25 days/month). The most frequent usual route of MA use was snorting (44%) followed by smoking (34%) and injecting (20%).

3.2.4. MA-related problems

The majority reported a variety of problems associated with MA use: weight loss (84%), sleeplessness (78%), financial problems (73%), paranoia (67%), legal problems (63%), hallucinations (61%), work problems (60%), violent behavior (57%), and dental problems (55%). Skin problems (36%) and high blood pressure (24%) were reported by fewer respondents. Males were more likely than females to report work problems (70% vs. 48%) and high blood pressure (31% vs. 16%), and females were more likely to report skin problems (47% vs. 27%). Notably, no gender differences were seen in percent reporting MA-related violent behavior.

3.2.5. Acquisition/distribution/manufacture

Considering distribution/acquisition patterns, most respondents (84%) reported one primary source for MA, with that source usually being male (79%). However, only 35% report receiving MA from only one source in a typical week. When not using that one primary source, three-quarters of respondents bought from someone else and almost half received MA from a friend. Respondents, however, were less likely to use another drug (25%) or go without MA (40%) if the main source was unavailable. Eighty-five percent received MA without paying for

it, most commonly by getting it for free (81%), trading something (including sex) (61%), or having the dealer front it (61%). It was less common to receive MA without paying for it, by dealing it (30%), stealing it (18%), or cooking it (13%). When respondents did not buy MA, friends (72%), dealers (65%), or spouses (29%) usually served as suppliers. Coworkers (10%) and other family members (14%) were less likely to provide MA without cash.

While males and females reported many similar MA acquisition behaviors, there existed some interesting gender differences. Males were more likely to use another drug if their main source was unavailable (34% of males vs. 13% of females). When acquiring MA through means other than purchase, males were more likely than females to steal it (24% of males vs. 11% of females) or cook it (16% vs. 5%). Consistent with means of initiation, data on acquisition when the respondent did not have the money to purchase MA showed that males were more likely than females to obtain MA through coworkers (15% vs. 3%), and females were somewhat (but not significantly) more likely to gain access through spouses (35% vs. 24% of males).

Fifty-six percent of the respondents reported having sold MA. Thirty-seven percent of those who sold did so within 1 month of starting use. The average time selling was ∼ 4 years. Forty-two percent reported carrying a weapon while dealing. Although similar percentages of males and females dealt MA, they differed in the rapidity of selling following initial use. Over half (52%) of males began selling within a month of first MA use compared with 17% of females. Gender differences were not significant in carrying a weapon while dealing, although males were somewhat more likely than females to carry a weapon (48% vs. 35%).

Thirteen percent of the respondents reported having made MA. Reported locations of production included another's house (57%), motel (37%), mobile vehicle (37%), one's own house (30%), outdoors (26%), and a storage unit (20%). Almost three-fourths of this population felt that the necessary chemicals were easily obtainable. While not statistically significant, males who had made MA were more likely than females to have cooked MA in their own homes or in mobile vehicles.

3.2.6. Treatment

Respondents reported an average of 9 years from their first MA use to their first admission to treatment for MA use, with no significant gender differences. The average duration of this initial treatment episode was 3.28 months, significantly longer for females (3.90) than for males (2.76). Following the first treatment, 58% had relapsed to MA use within 6 months.

4. Discussion

Results show the sample to have a number of potential vulnerability factors, to have early substance use and polydrug histories, and to engage in a variety of MA-related risk behaviors. These characteristics create challenges for prevention and treatment development. Moreover, they point to several areas where further research is needed. While many MA-related characteristics and behaviors are similar for males and females, gender differences in certain

factors were shown. Females were more likely to be introduced to MA and continue to gain access to MA through spouses/boyfriends than were males, who were more likely to be introduced through friends and gain later access through coworkers than were females. Males were more likely to have engaged in injection drug use than were females. Males who sold MA did so more quickly after starting MA use than did females. MA-related problems differentiated genders, with females more likely than men to report skin problems and males to report work problems and high blood pressure. Females had longer episodes than did males the first time they were in treatment for MA use.

Early substance use is reported by this sample, with these MA users reporting even earlier substance use than found in the arrestees studied by Pennell et al. (1999). Polydrug use is also common, with more types of drugs being used by males than females. Respondents began using substances on the average by 12 years of age and had used 5 of 10 substances (usually in addition to MA, alcohol, tobacco, and marijuana). The early initiation age and lack of gender differences in initiation age underscore the importance of prevention messages reaching both genders in the preadolescent period.

Initial use of MA was earlier by about 1 year than reported by Gonzalez Castro, Barrington, Walton, and Rawson (2000) or Pennell et al. (1999). We also see rapid escalation from initial to regular use of MA (similar to that reported by Gonzalez Castro et al., 2000). Respondents appear to be embedded in a drug lifestyle before MA initiation, perhaps facilitating escalation to regular use. These results and the somewhat (but not significantly) more rapid escalation to frequent use by females support a need for further exploration of pathways and trajectories of MA use. The earlier reported use of MA in our sample than by other researchers suggests a changing dynamic of MA use and warrants examination of populations with more recent MA initiation.

Consistent with Simon et al. (2002), results indicate frequent and prolonged daily use, concomitant with respondents' common conception of MA as a "functional drug." The long latency period between first MA use and treatment (about 1 year longer than that reported by Gonzalez Castro et al., 2000) is also consistent with the perceived functional usage of MA. However, despite the many negative consequences associated with MA use, the myth of its functionality persists. The paradoxical logic inherent in MA users' reports agrees with other research; Pennell et al. (1999), for example, found that only 25% of the MA-using arrestees had ever received treatment, and the remainder never sought treatment because they did not need it, did not want it, or reporting they were "not a daily user," "can stop anytime," "have control over it," and "use is not a problem."

The high rates of reported paranoia, violent behavior, hallucinations, and financial, legal, and work problems related to MA (considerably higher than those found by Pennell et al., 1999) underscore the potentially significant social costs in terms of medical and psychiatric treatment, lost productivity, and criminal behavior. These potential costs justify continued research focus on specializing prevention and treatment programs to needs and character-istics of MA users. Both motivation for and impact of MA use must be addressed and remedied during treatment so that they do not spur relapse and so that potentially expensive long-term effects of MA are minimized. For example, if many initiate MA use to lose weight and do indeed lose weight during use, then treatment, during which many may be

gaining weight, must include managing the resulting changes related to MA abstinence. In addition, treatment may aid those who have used MA to enhance sex in learning of non-MA-dependent sex behaviors.

Gender differences in motivation for initial use as well as MA-related problems can help guide prevention and treatment strategies. Weight loss and desire for more energy, more likely in females than males, suggest a different focus than do those more distinguishing (but not significant) for males of working more and better sex. Males are more likely to report MA-related work problems and high blood pressure than are females, while females are more likely to report skin problems than are males. Problems more distinguishing of females may represent a higher perceived social value on appearance, and for men on work. These gender differences suggest ways of specializing strategies in drug education and intervention to different audience/client subgroups. In addition, intervention strategies should include educating practitioners about symptoms/problems of MA use to facilitate identification and provision resources for treatment. Many of the reported problems could result in MA users seeking care for problems other than substance use (e.g., high blood pressure, paranoia, and hallucinations); and males and females may present with different syndromes of symptoms.

Results provide insight into the networks of MA users that may enable abuse. Understanding MA users' networks may facilitate the identification of routes of reaching MA users and means of breaking those networks as well as provide direction for relapse prevention strategies. As early substance abuse and rapid rate to regular use indicate, other results imply that MA users belong to networks of users: a majority initiate "through friends," and although most have one main source, many also receive MA from friends. Gender differences point to distinct relationships between users and their networks. Females' access to MA by their spouses/boyfriends may indicate an already established and more deeply integrated structure of family and drug use.

Results concerning selling MA may also reflect networks of users. Rapid transition from initial use to selling illustrates the facility with which the MA network engulfs a user. Our results diverged from previous research, showing higher rates involved in selling or making MA. Pennell et al. (1999) found that about 21% reported selling; in comparison, 56% of our MA sample reported involvement with selling MA. The percentage reporting cooking MA was small in both studies but larger (13%) in our treated sample than in the Pennell et al. arrestee sample.

These results should be interpreted within the limitations of the study. Because of the exploratory nature of the study, many variables were included for description and to potentially differentiate between genders. As discussed earlier, the results are primarily descriptive. While gender differences have been assessed statistically, the large number of such tests requires a conservative interpretation. Some adjustment in probability was presented; however, differences resulting for this sample should be explored in other samples to assess the stability of results. While interviews were done recently (1998–2000), initiation of MA use occurred earlier for most users; the average age at interview was 32.6, while the average age of first MA use was ~19. With increasing MA prevalence, increasing proportion of female MA users, and geographic penetration of use across the United States, the ecology of use may be changing. It will be important to periodically update this type of

research to determine whether characteristics of use and gender differences remain stable across time.

The current study provides extensive description of MA-related behaviors and problems for a sample of clients treated in a large publicly funded treatment system. Results suggest more male–female similarities in substance use behaviors than differences; however, significant differences do exist that may have implications for gender-specific research as well as for prevention and treatment strategies. As mentioned, future work should assess the stability of these results across both time and a broader diversity of MA users. In addition, results identify areas where more targeted (and thus more powerful) analysis can focus.

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